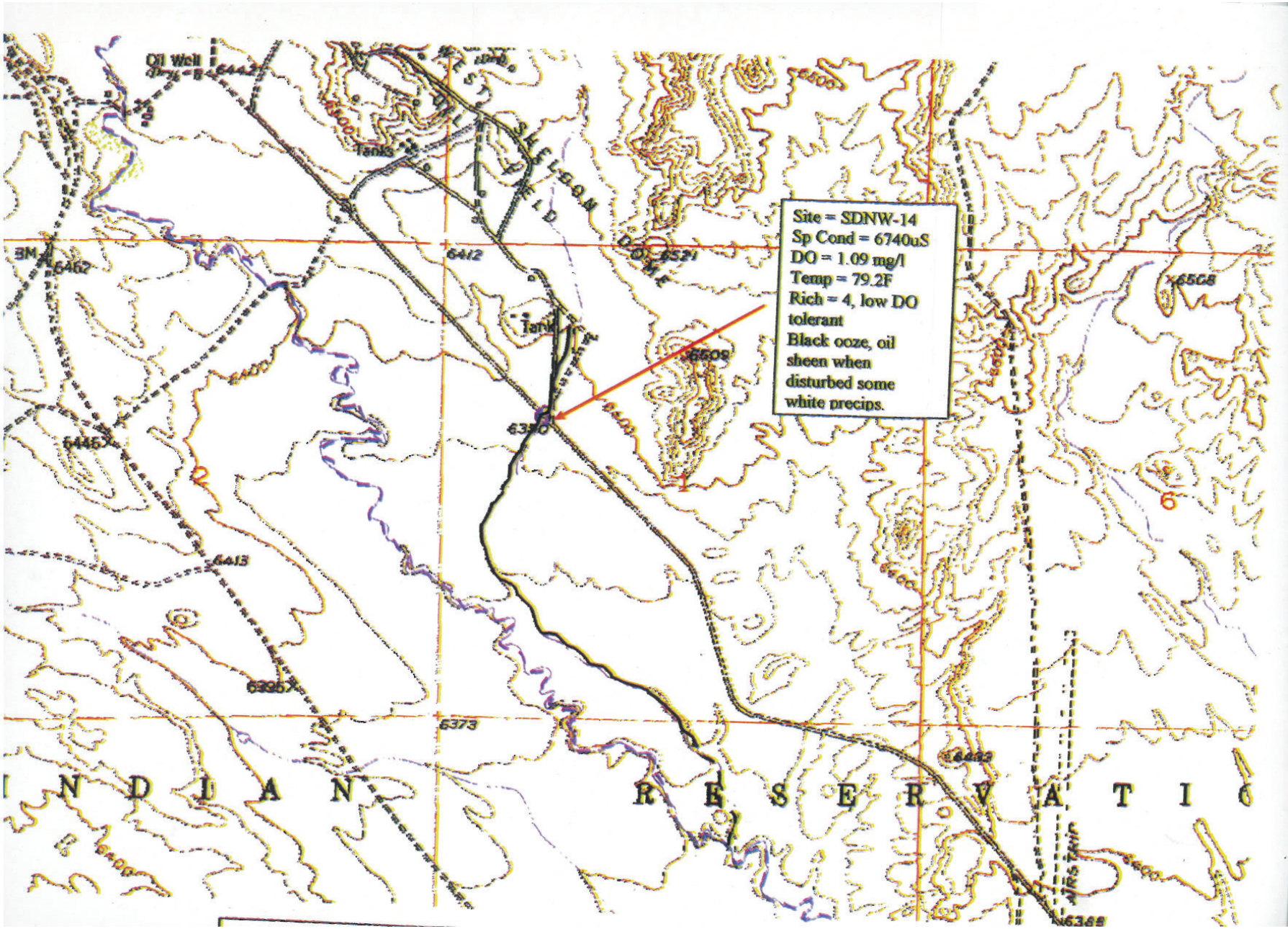
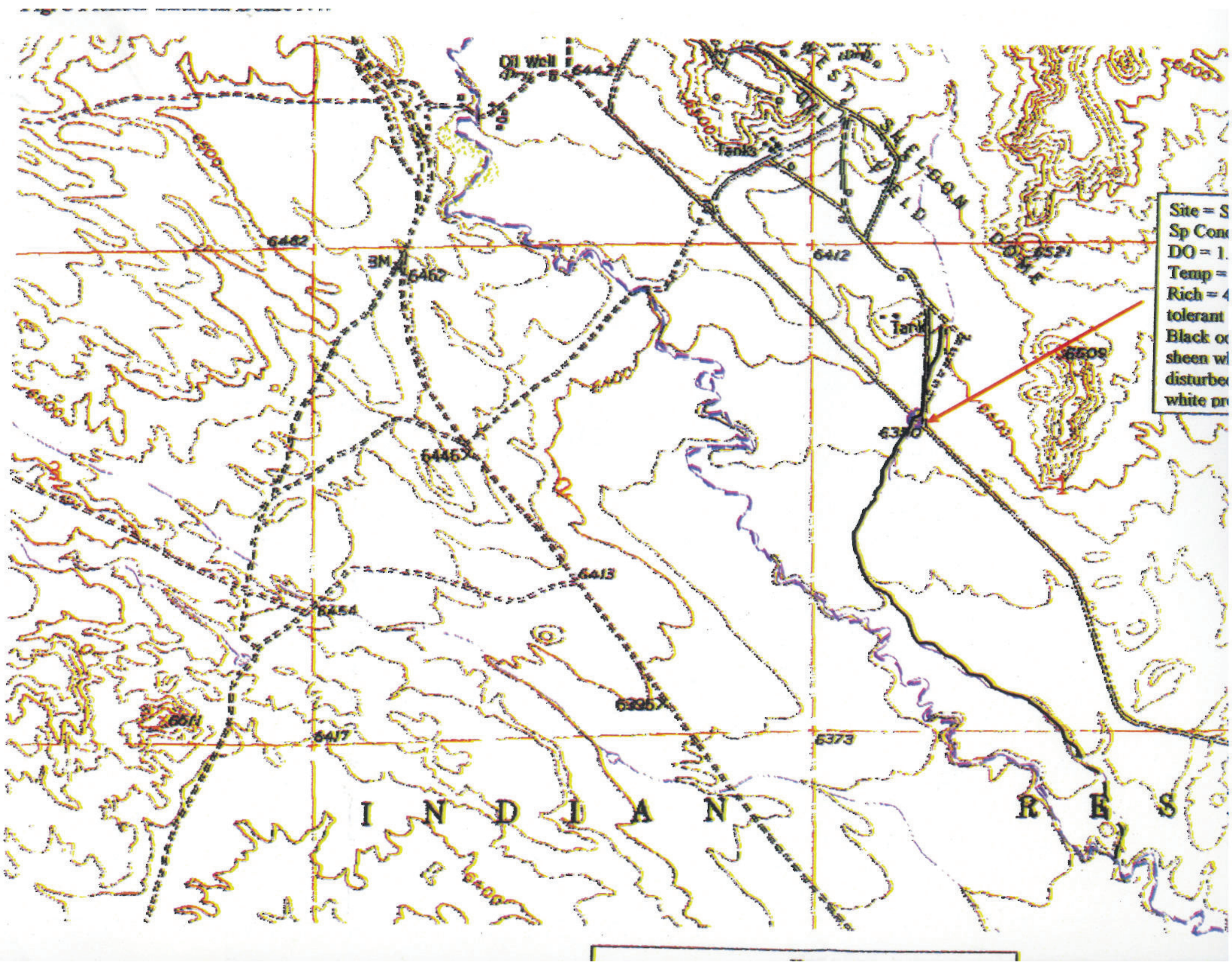
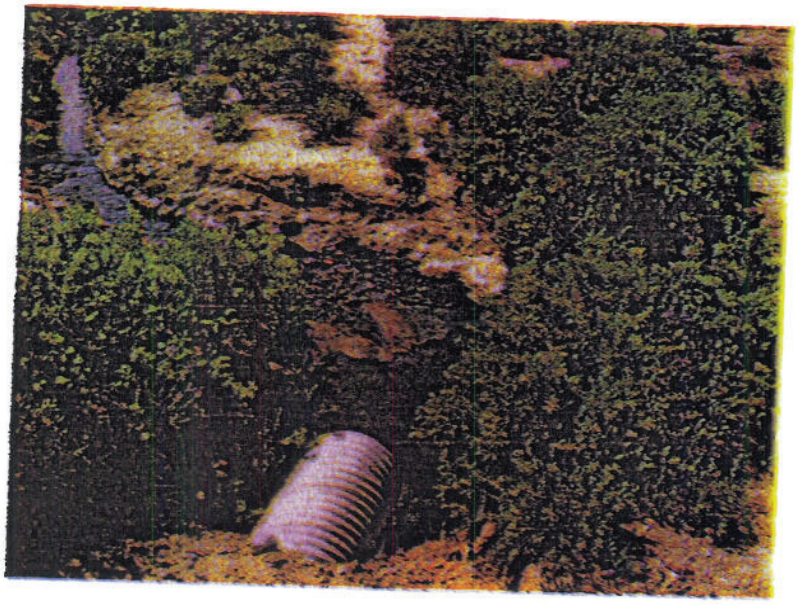
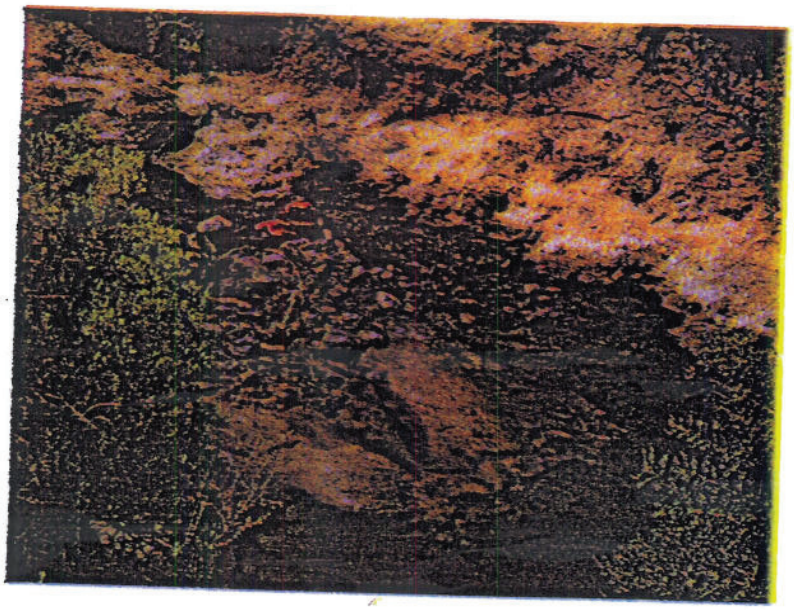

Site = SDNW-14
Sp Cond = 6740uS
DO = 1.09 mg/l
Temp = 79.2F
Rich = 4, low DO tolerant
Black ooze, oil sheen when disturbed some white precips.
Oil Well
Tank
INDIAN RESERVATION


Site = S
Sp Con
DO = 1.
Temp =
Rich = 4
tolerant
Black o
sheen w
disturbe
white pr
Oil Well
Tanks
Tank
BM
6462
6482
6412
6521
6509
6446
6413
6454
6611
6417
6373
6350
6400
6500
INDIAN
RES

Four species of macroinvertebrates were found in low numbers and all are tolerant of high TDS and low DO. The ***Brachycercus*** mayflies were adults that could have lived as nymphs elsewhere and were attracted to this water segment for swarming purposes.



SDNW14-1: The discharge contains very high levels of sulfur both as sulfide and sulfate. The low Do creates thick black ooze called sapropel for a substrate.



SDNW14-2: Several species of low DO tolerant macroinvertebrates were found but only in the pools where they could come to the surface to get atmospheric oxygen.

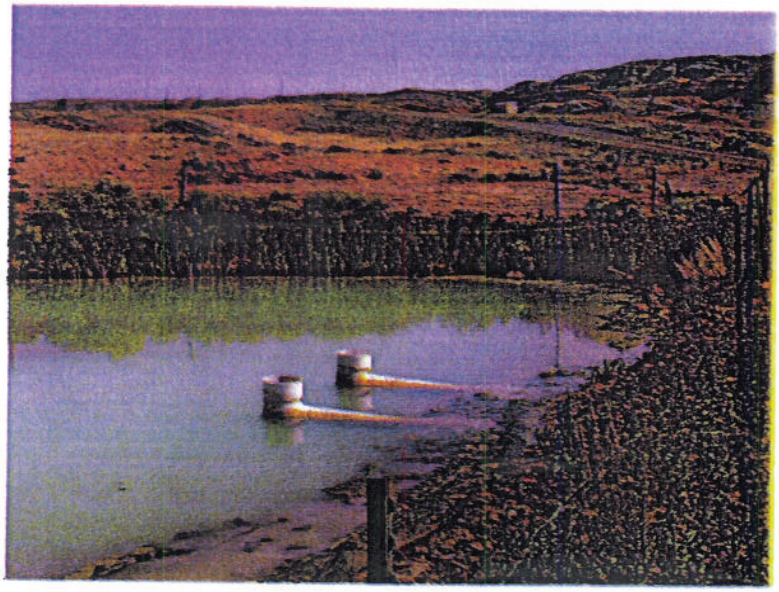
Circle Ridge/Coal Draw near NPDES point (CR-7.5)

NPDES sites

Site	Site name	Str or Lk name	II_Geology	VI_Ros I_1	VI_Ros II_1	VI_Ros I_2	VI_Ros II_2	elev	Lat	Long	VIII_Anth_Ps_6	IX_Degree_6	Lim Season_6	X_Status	XI_Mgmt
CR-7.5	Circle Ridge @ first pond outlet	Circle Ridge NPDES Creek	Sed	C	precip on 6c			6845	43° 31' 09.3"N	109° 03' 01.7"W	NPDES_O&G	Dep	AS	PS	Perm

This site is tentatively classified as a modified Rosgen C with precipitation deposits on black sapropel ooze. The water was a cloudy milky white and somewhat turbid. This is probably because of the very high barium levels and the high sulfides. As the sulfides become oxidized to sulfates the compound barium sulfate readily forms, is insoluble, a distinct white colored precipitate forms. Barium is often used in laboratory tests for the presence of sulfate ions because of this. A 30 day average level of 1 mg/l or 5 mg/l as an acute value is used as the barium standard and criteria in British Columbia (http://wlapwww.gov.bc.ca/wat/wq/BCguidelines/working.html).

The oxygen was 4.77 mg/l on Aug. 09, 05. Four species of macroinvertebrates that were found all breathe atmospheric oxygen and are tolerant of low DO conditions. The oxygen was relatively high when sampled (4.77 mg/l) but the low DO tolerant macroinvertebrates indicate that much lower DO's have probably been encountered in the past. These macroinvertebrates are found in ponds and the pools of the stream where they can come to the surface to get the atmospheric oxygen.



CR7.5-1: The distinct milky white color of this pond is probably due to the formation of barium sulfate.

Inset Fig. 6

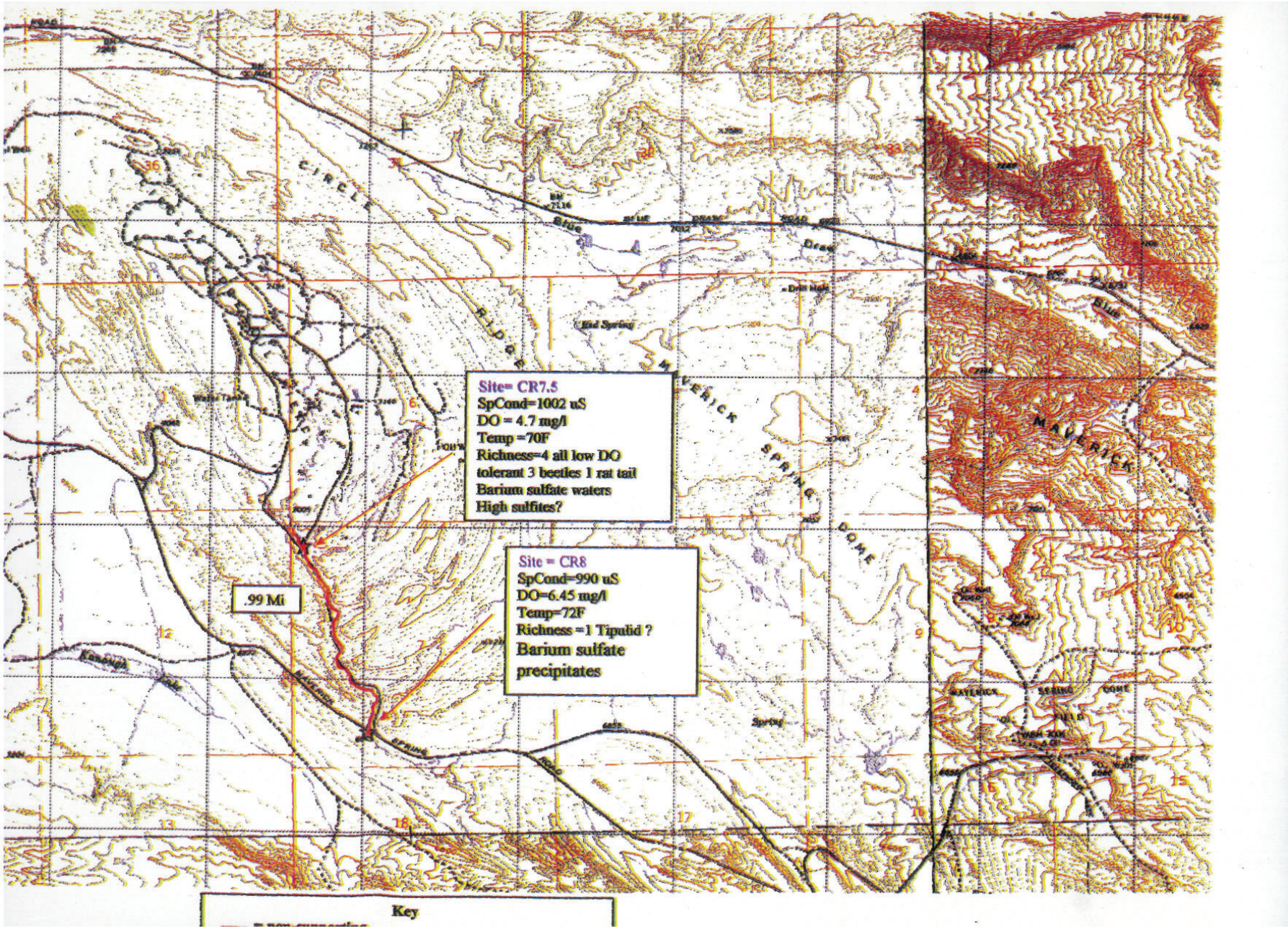
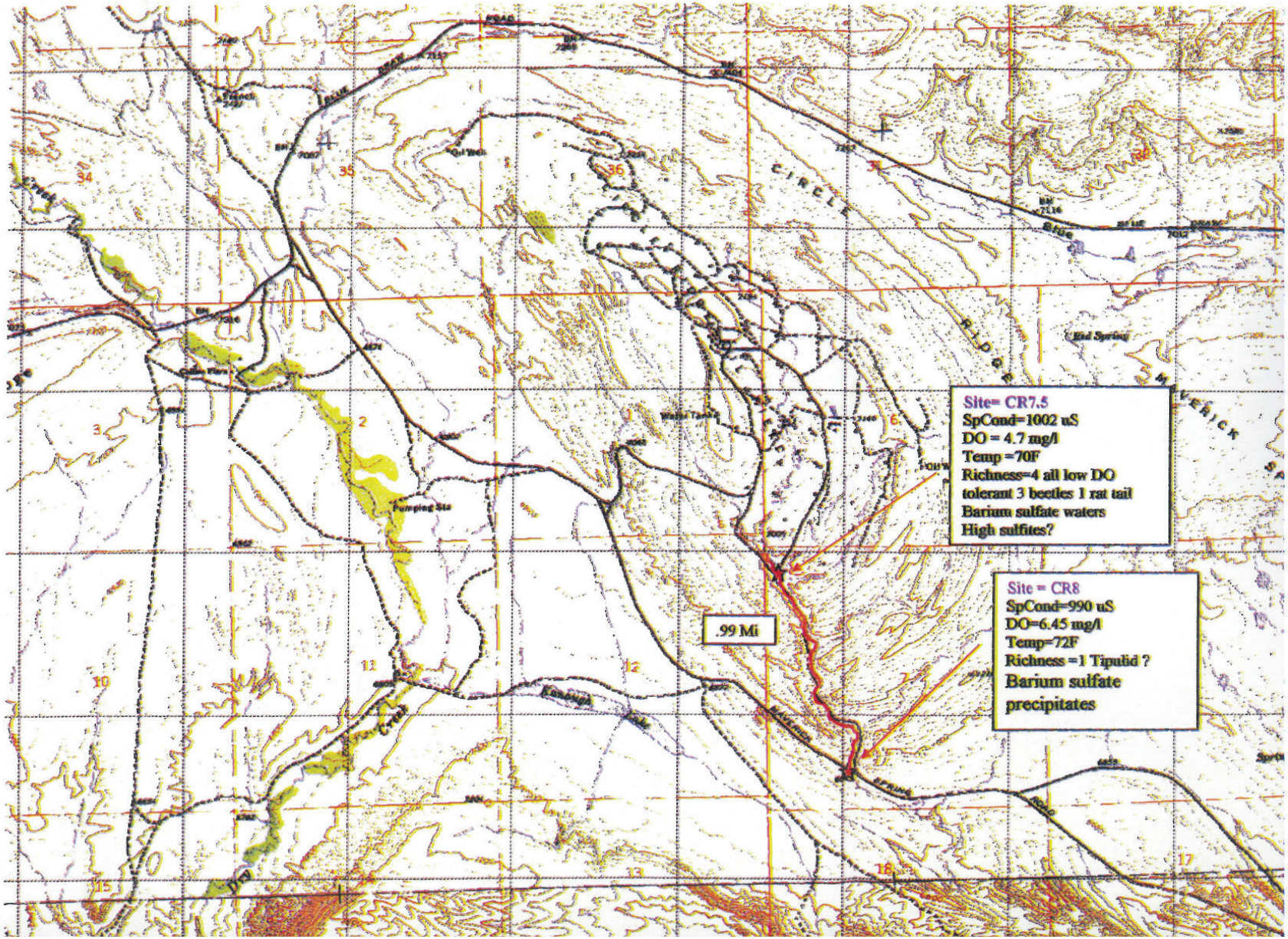
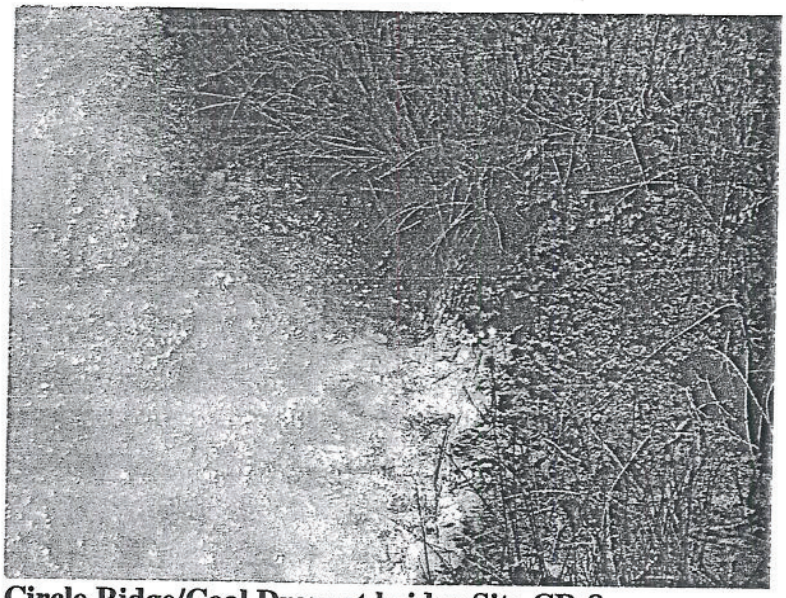

Site= CR7.5
SpCond=1002 uS
DO = 4.7 mg/l
Temp =70F
Richness=4 all low DO tolerant 3 beetles 1 rat tail
Barium sulfate waters
High sulfites?
Site = CR8
SpCond=990 uS
DO=6.45 mg/l
Temp=72F
Richness =1 Tipulid ?
Barium sulfate precipitates
.99 Mi
Key
CIRCLE
RIDGE
MAVERICK
SPRING
DOME
Blue
Draw

Figure 6 Circle Ridge



CR7.5-2: Barium sulfate is relatively insoluble and forms white precipitates on the bottom and along the edges of the stream.

CR7.5-3: Atmospheric breathing macroinvertebrates such as rat-tail maggots and Dytiscid beetles live in ponds and slow moving pools.



Circle Ridge/Coal Draw at bridge Site CR-8

CR7.5-4: Another view of the milky colored water. This turbidity and the precipitates will keep macrophytes and vegetation from colonizing this stream segment.

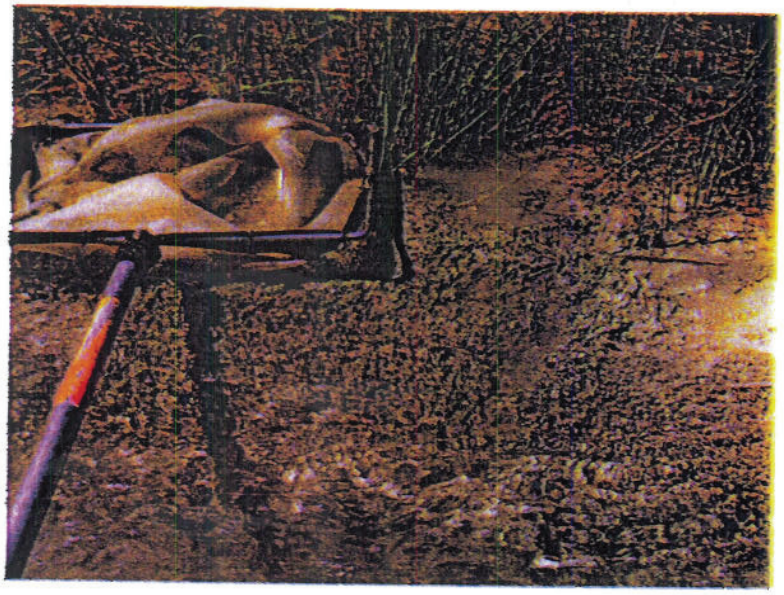
NPDES sites

Site	Site name	Str or Lk name	II_Geology	VI_Ros I_1	VI_Ros II_1	VI_Ros I_2	VI_Ros II_2	elev	Lat	Long	VIII_Anth_Ps_6	IX_Degree_6	Lim Season_6	X_Status	XI_Mgmt
CR-8	Circle Ridge @ wooden bridge	Circle Ridge NPDES creek	Sed	C	precip on 6	C	precip on 4	6960	43° 30' 22.3"N	109° 02' 42.8"W	NPDES_O&G	Dep	AS	PS?	Perm

The white barium sulfate precipitates cover both the gravel and sand substrates in the faster water and the black sapropel ooze at the edges and slower water. Some precipitate-covered macrophyte beds (*Chara*) were observed and probably aide in adding oxygen to the water through photosynthesis. The water is still a milky white color but not as dense as nearer as site CR-7.5 and nearer the discharge point. Barium was 857 ug/l and the sulfides were still very high at 26,400 ug/l. Both of these are a concern. This stream segment is tentatively considered as partially supporting of its aquatic life use, but the toxic water chemistry screen done at the NPDES outfall will aide in this evaluation.

The only macroinvertebrate found was a Tipulidae fly larvae. Even though the oxygen was at 6.45 mg/l the precipitates on the substrate and the faster currents and lack of pools probably cause the lack of other macroinvertebrates. A northern leopard frog (*Rana pipiens*) was caught and released back to the riparian area.

CR8-1: The water was still a white milky color at the bridge, but not as turbid as the upper site.



CR8-2: This is a precipitate covered mat of the algae Chara. The algae looks like a higher plant and is coarse and rough to the feel.